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BOTTLED WATER STUDY

A PILOT SURVEY OF WATER BOTTLERS AND BOTTLED WATER

ENVIRONMENTAL PROTECTION AGENCY

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WATER SUPPLY DIVISION
ENVIRONMENTAL PROTECTION AGENCY

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BOTTLED WATER STUDY

INTRODUCTION

Although piped water is available to at least 75 percent of the nation's population, the production and sale of bottled water has become an established and growing industry. In some parts of the country, particularly in those areas where the only available natural water is heavily mineralized, bottled water has always been an important source of drinking water. Since the recently aroused interest in our environment, the use of bottled water has rapidly increased. Fears regarding the pollution of city water supplies, whether or not founded on fact, have caused people to distrust the quality of the product issuing from the faucet. In addition, a dissatisfaction by the public with the taste and odor of their drinking waters has influenced the increase in the use of bottled waters. Rising affluence has also had a part, since people could now afford to purchase a deluxe product, supposedly much superior to the every day waters that the city water system provided. When, in 1970, a study of Community Water Supplies was published by the Water Supply Division, Environmental Protection Agency (then the Bureau of Water Hygiene, United States Public Health Service), the bottled water industry received an unexpected (and unintentional) boost. The study revealed shortcomings and potential hazards in many community water supplies, and the immediate reaction of the public was distrust of piped water and an increase in sales of bottled water.

The Water Supply Division recognized the importance of this increase in the use of bottled waters by the public and was interested in determining the quality and health surveillance being provided by the manufacturers. To determine existing conditions a small pilot survey was undertaken.

CONCLUSIONS AND RECOMMENDATIONS

While the pilot survey was limited in scope and represented less than five percent of the bottling firms in this country, it is evident that there are deficiencies in surveillance, facilities and their operation, and plant quality control. These deficiencies result in the production of bottled water whose quality does not comply with the 1962 U.S. Public Health Service Drinking Water Standards. While the water quality violations are not widespread, they are of sufficient significance to warrant corrective action.

The pilot survey of 25 bottling establishments, and bacteriological and chemical examination of approximately 50 bottled water products revealed the following:

1. Eight percent of the bottled water samples examined evidenced the presence of the coliform organism, which is an indicator of the potential presence of pathogenic bacteria. High standard plate counts gave additional evidence of contamination.

2. Gross changes in the standard plate counts were noted in the 25 samples that were examined during a 63-day storage test. While the bacteria counts of six samples remained at or near zero for the entire test period, four rose to levels which had to be classified as "too numerous to count," while the remainder fluctuated widely with no definite, discernable pattern.

3. While only one sample exceeded a mandatory Drinking Water Standard limit for chemicals, discrepancies were found between the actual chemical composition and that stated or implied by the label in several cases.

4. Quality control measures were generally deficient in that bacteriological and chemical analyses of the bottled water were not regularly performed. Bacteriological surveillance was judged inadequate in more than half of the firms inspected while chemical surveillance was inadequate in almost all cases.

a. Only 11 of the 25 bottlers collected four or more bacteriological samples per month. Three bottlers did not collect any samples for bacteriological analysis, and eight others collected only one sample per month.

b. None of the 25 bottlers reported ever having a complete chemical analysis of their bottled water. Only 12 bottlers reported a partial analysis for chemical constituents. Only four of these 12 reported a partial analysis more frequently than once per year.

5. Based upon criteria covering eight sanitation categories (Appendix E, Pg. 59 and 60), it was found that in many cases bottling was not performed under sanitary conditions. While deficiencies were found in all facilities surveyed, one-half of the firms failed to comply with five or more of the eight categories examined.

On the basis of these findings, the following recommendations are made to the appropriate Federal and State regulatory agencies.

1. Uniform regulations should be developed and applied to all bottling plants and products. The regulations should include minimum quality control procedures.

2. Bottling plants should be subjected to regular

surveillance to assure compliance with the regulations.

3. The significance and control of bacterial populations during production and growth during storage, as evidence by Standard Plate Counts of wide range and cyclic behaviour, should be investigated further.

In addition, the firms engaged in the bottling of water should make the following improvements in their operations:

1. Effective quality control procedures should be established and carried out.

2. Sanitation of bottling plants, facilities, and particularly plastic bottles should be improved.

3. Disinfection practices should be improved.

Because there are no nationwide standards for chemical and bacteriological quality of bottled water, it is specifically recommended that:

1. The quality of all bottled water meet the mandatory chemical and biological constituent limits of the current U.S. Public Health Service Drinking Water Standards, and

2. The level of sanitary and operational surveillance of bottling plants be raised to meet the requirements of those Standards.

BACKGROUND

The growth of the bottled water industry has not escaped the notice of the Federal Government. A bill was introduced in the House of Representatives, 91st Congress, that would have directed the Secretary of Health, Education, and Welfare to establish and carry out a bottled drinking water control program. This bill, with modifications required by the reorganization which placed some parts of the Public Health Service, DHEW, in the newly-created Environmental Protection Agency, was reintroduced in the 92nd Congress. This bill, if passed, would regulate only that bottled water marketed in interstate commerce, but it also contains a provision in regard to State regulations, requiring them to be at least as restrictive as the Federal standards. In addition, Safe Drinking Water Legislation, relating to public drinking water systems, under development in both the House and the Senate, would also extend the Environmental Protection Agency's jurisdiction to include bottled water.

There is some question as to the necessity for a law for the specific purpose of establishing quality standards and controls for bottled water. The Food and Drug Administration, by virtue of the Food, Drug, and Cosmetic Act, has jurisdiction over "Articles used for food and drink for man or other animals" when such products are sold in interstate commerce. This Act has been interpreted as giving the Food and Drug Administration power to establish standards of quality and to take action against purveyors of impure products. However, to date, the Food and Drug Administration has not established uniform standards of quality, nor does it have a routine program of surveillance of the bottled water industry.

Drinking water used by interstate carriers is subject to Federal quarantine regulations and must conform to the 1962 U.S. Public Health Service Drinking Water Standards. However, while these Standards define limits for various chemicals and other substances, as well as standards for bacteriological quality, the opinion of the legal staff of the U.S. Public Health Service is that the Federal government can enforce only the latter criteria.

The American Bottled Water Association, which represents a large proportion of the producers of bottled water, has minimal standards for the production, processing and distribution of bottled water. (See Appendix A.) Its minimal standards for the quality of drinking water are the 1962 Public Health Service Drinking Water Standards. The American Bottled Water Association has no powers of enforcement but can withdraw its voluntary certification of a bottling plant when standards are not met. Loss of certification will not halt operations of the plant since the Association is a voluntary organization of companies.

In essence, then, the regulation of the quality of water sold in bottles is a function of each of the States. Just as there are 50 states, there are 50 different sets of regulations. Of these, some appear to be excellent, clearly defining standards of quality. Others are as vague as the criteria used by FDA, and in some cases there are no specific written regulations at all; the state may ignore the bottling of water or may interpret its Pure Food or other laws to include bottled water.

Appendix B is a tabulation of State regulations, with brief summaries of that portion of each which deals with water quality. Also included is similar information for Guam, Puerto Rico, the Virgin Islands and the District of Columbia.

Appendix B, compiled in early 1971, includes 22 States which have no specific regulations, 24 which define the quality standards vaguely for bottled water, and eight which spell out definite standards for bacteriological and chemical quality. Some of the States cite the absence of water bottlers within the State as being the reason for lack of definitive water bottling regulations. Yet, when an investigation into the extent of the bottling industry was made (Appendix C), bottlers were found in almost every State, and in no case was it definitely established that a State had no bottlers within its boundaries.

In summary, the present status of bottled water regulation consists of limited application of the Public Health Service Drinking Water Standards, the similarly limited criteria and their application by the Food and Drug Administration, the unenforceable criteria and incomplete application of the American Bottled Water Association's guidelines and State regulations which are at best widely varying in scope and at worst are non-existent.

SCOPE OF PILOT SURVEY

Purposes of the Survey

In view of the role that the Environmental Protection Agency may acquire in regulating bottled water, it was concluded that a pilot study of water bottlers and bottled water should be untertaken to obtain background information.

The purposes of the survey were (1) to determine the adequacy of source protection, treatment, bottling procedures and quality control at the bottling plants; (2) to determine the quality of bottled water as sold to the public; and (3) to determine the extent of bacterial growth in bottled water during the interim between bottling and ultimate consumption.

Selection of Bottled Water Plants

Twenty-five bottlers were selected from states to provide geographic distribution. The selection was based on a number of criteria: the state must have a significant number of bottlers from which to choose; the bottlers must be on or near a direct air route to one of the Water Supply Laboratories so that water samples for bacteriological examination would be received promptly; the state involved must be willing to cooperate; both members and non-members of the American Bottled Water Association would be represented; and states having good bottling regulations and those having relatively poor regulations would be included. After selection of the bottlers, an individual or team from Water Supply Division headquarters would travel to the area, meet with Regional and/or State personnel, and then proceed to each of the selected bottlers. The states selected were California, Connecticut, Ohio and Texas.

Selection of individual bottlers from each State was made chiefly by geographic location. In Connecticut, proximity to the Northeast Water Supply Laboratory at Narragansett, Rhode Island, was the principal criterion. Ohio bottlers were selected in the area near the Cincinnati Laboratory. Because of limitations imposed by airline connections to the Gulf Coast Laboratory, Texas bottlers were selected only from the Houston-Galveston area. California bottlers to be surveyed were selected by the California State Health Department, but the selection followed the same pattern. The Los Angeles area provided the best airline connections to the Northwest Water Supply Laboratory at Gig Harbor, Washington. The plants visited are listed in Appendix D.

Survey Procedures

A comprehensive inspection of each bottling plant was performed. The plant survey form (Appendix E) was evolved from elements of forms used in the Interstate Carrier Water Supply Program and the guidelines of the American Bottled Water Association. Among the facets of the bottling operation covered were: water source, treatment, plant facilities and sanitation, employee sanitation, water handling equipment, water storage facilities and bottle handling sanitation.

Connecticut was visited the week of November 29 – December 3, 1971; Ohio, December 13–17; California, January 3–7, 1972; and Texas, January 10–14. Six bottling plants in Connecticut were surveyed, five in Ohio, eight in California and six in Texas for the total of 25.

Bottling Plant Construction, Sanitation and Operation

The criteria for evaluating bottling plant construction, sanitation and operation closely followed the survey from (Appendix E). If a plant inspection revealed that "Yes" answers to each of the questions in sections A through E and G through H were applicable, the respective items were judged to be satisfactory. In section F, "Yes" answers to questions 1, 2 and 4 were expected, while question 3, "Are there any cross-connections," should have received a "No" answer if a satisfactory rating was to be given for the section on Storage Tanks and Piping.

Analytical Quality Control

Because of the wide variations in the size of bottling operations, nature of the source, and the extent ot treatment, evaluation of the adequacy of analysis of the "finished" water was somewhat subjective. However, bacteriological control was judged to be adequate if a sample was tested at least weekly for the smallest plant, while the large, full-time operations were expected to perform daily tests. Judgment of the adequacy of chemical control, for a particular bottling plant, was based on both the analytical frequency and completeness. If the analysis included only pH, or an estimation of ozone level by odor, for example, credit for partial analysis only was given. If the chemical analyses, however complete, were performed at intervals of a year or more, control was judged inadequate.

Analysis of source water composition was judged on the basis of criteria similar to those used to judge control of "finished" or product water. Bottlers using a municipal water supply as a source were not considered in this latter aspect of the evaluation, on the basis that this aspect of quality control is a responsibility of the municipal system.

Sampling and Analysis

At the time of the plant inspection water samples were collected for subsequent laboratory analysis. Samples of the source water were taken for both chemical and bacteriological analyses. If the composition of the water was changed as part of the processing scheme (any treatment process other than disinfection), an additional sample of the processed water was taken for chemical

analysis. Additional bacteriological samples were taken from the filling line, and a case of 1-gallon bottles or one 5-gallon bottle was collected from that day's run for storage tests. Chemical analyses included "wet chemistries" (turbidity, color, total dissolved solids, chloride, sulfate, nitrate, arsenic, selenium, boron, cyanide, specific conductance, pH, surfactants) and metals (chromium, copper, manganese, lead, iron, cobalt, cadmium, zinc, nickel and mercury). Bacteriological analyses included coliforms, fecal coliforms and standard plate counts, as well as tests for *Pseudomonas aeruginosa*. All chemical analyses were performed at the Northeast Water Supply Laboratory, Environmental Protection Agency, while bacteriology was done at the nearest Environmental Protection Agency Water Supply Laboratory. The storage tests included results after 1, 3, 5, 7, 10, 14, 21, 28, 35, 49 and 63 days.

FINDINGS AND DISCUSSION OF RESULTS

Bottling Facilities, Operations, and Quality Control

A wide assortment of water treatment processes were encountered and are summarized in Appendix F. Ozone and ultraviolet disinfection were preferred by bottlers over chlorination because of the taste characteristics of the latter. Laboratory control data revealed virtually complete lack of source water testing or chemical analysis of finished water. This aspect of bottled water compares most unfavorably with community water supplies, where at least some chemical constituents are routinely determined in the finished water, and where at least surface water sources are frequently subjected to chemical analysis. Only the large, full-time bottling operations provided for bacteriological analyses of the finished water on a regular basis, and essentially these were the only ones who checked the disinfectant level in the water. Table I summarizes the analytical quality control found at the 25 plants that were inspected.

Sanitation of the physical facilities covered the range from unwashed floors and run-down equipment to sparkling cleanliness and modern automated equipment. The most common failing was lack of proper ventilation or the absence of screens on windows and doors. Failure

TABLE I – Laboratory control of bottled water and source water.

(A = Adequate, X = Inadequate, Part = Partial Analysis
NA = Not applicable because public supply used as source. See Text.)

Bottler	Finished water		Source	
	Bacteriological	Chemical	Bacteriological	Chemical
1	A	X	X	X
2	X	X	X	X
3	X	X	X	X
4	A	Part	NA	NA
5	X	X	X	X
6	X	X	X	X
7	Part	X	NA	NA
8	X	Part	X	X
9	X	X	NA	NA
10	A	Part	X	X
11	X	X	X	X
12	X	X	X	X
13	X	X	X	X
14	X	X	NA	NA
15	Part	X	X	X
16	Part	X	X	X
17	X	X	NA	NA
18	A	A	A	A
19	A	A	A	A
20	X	X	NA	NA
21	A	Part	X	X
22	A	Part	X	X
23	Part	X	X	X
24	Part	Part	X	X
25	Part	X	NA	NA

TABLE II – Evaluation of bottling facilities and procedures.

(S = Satisfactory; X = Deficiencies. See Text.)

Bottler	Floors	Walls and ceiling	Vent and light	Toilets	Employee sanitation	Storage	Equipment maintenance	Bottle filling and labeling
1	X	X	X	S	S	S	X	X
2	X	X	X	S	X	S	S	S
3	X	X	X	S	X	X	X	X
4	X	X	S	S	S	S	X	S
5	X	S	X	X	X	S	X	X
6	X	X	X	S	S	S	S	X
7	X	S	X	S	S	S	S	S
8	X	X	X	X	X	S	X	X
9	X	S	X	X	X	S	X	X
10	S	S	S	S	X	S	S	S
11	S	S	X	S	X	S	S	X
12	X	X	X	X	X		X	X
13	X	S	X	X	X	S	X	X
14	X	X	X	S	X	X	X	X
15	X	X	X	X	X	S	S	X
16	X	S	X	X	X	S	S	X
17	X	X	X	X	X	S	X	X
18	S	S	S	S	X	S	S	S
19	X	S	S	S	X	S	S	S
20	X	X	X	X	X	S	X	X
21	S	S	S	S	X	S	X	S
22	S	S	X	S	X	S	S	S
23	S	S	X	S	X	S	X	S
24	X	S	X	S	X	X	X	S
25	X	S	X	X	X	S	S	S

to require employees to receive regular physical examinations was common. For the most part, bottles were sanitized and bottle filling was done under sanitary conditions. The major exception was the handling of plastic bottles. These arrived at the plant in cardboard cartons and are shipped without caps, thus the interiors are exposed to airborne contamination, and the presence of foreign matter. Yet, these bottles are presumed by the bottlers to be sanitary enough to be filled without even rinsing. Glass bottles are usually washed with hot caustic solution, but the temperature or strength of the caustic solution is seldom monitored. Bottle caps are sometimes used directly from the package in which they are received, sometimes (but not always) disinfected and frequently placed on by hand. The significance of employee sanitation and facilities maintenance is that the product (water, in this case) is subject to contamination, not only from the containers, but also from the physical surroundings and the people who come in contact with any part of the bottling operation. Table II summarizes the adequacy of the bottling facilities and procedures.

The last step in the bottling operation, the affixing of labels, showed some instances of failure to conform to factual labeling practice. At least two well waters were identified as being springwater, and there were instances of deionized water being labeled as distilled water or vice versa.

Bacteriological and Chemical Quality

The results of chemical and bacteriological analyses of bottled and source waters are summarized in Tables III through VI.

Chemical analyses (Table III) revealed one sample of bottled water with a lead concentration above the mandatory 1962 U.S. Public Health Service Drinking Water Standards limit. The corresponding raw water contained a much lower lead concentration, but the source of the lead could not be ascertained. The recommended limit on Total Dissolved Solids was exceeded in three samples, and the recommended limit on copper exceeded in one sample of bottled water. One water, reconstituted from distilled water, contained an intentionally high concentration of iron. Polyphosphates were added to this water to sequester the iron. Arsenic concentrations were reported as containing less than 0.03 ppm because of limitations of the analytical method used.

TABLE III – Results of chemical analyses of bottled water, in parts per million.

(Figures in parentheses represent PHS drinking water standards limits * = recommended, ** = mandatory.)

Sample no.	TDS (500)*	Cl (250)*	SO_4 (250)*	NO_3 (45)*	Cu (1.0)*	Mn (0.05)*	Pb (0.05)**	Fe (0.3)*	Zn (5.0)*	Hg(d)	(0.01)* AS(0.05)**
13287	382	7	38	25.8	0.009	0.002	0.025	0.016	0.049	0.5714	0.00
13289	18	5(a)	1(b)	0.7	0.236	0.001	0.008	0.010	0.123	0.1918	0.00
13291	39	5	1	0.1	0.008	0.000	0.010	0.013	0.044	0.1865	0.00
13282	18	5	1	0.4	0.021	0.001	0.019	0.013	0.044	0.0355	0.00
13283	14	5	1	0.4	0.016	0.001	0.019	0.010	0.047	0.0000	0.00
13285	326	5	122	0.7	0.054	0.002	0.028	0.014	0.075	0.0421	0.00
13294	556	5	67	19.5	0.021	0.001	0.015	0.020	0.014	0.0329	0.00
12094	8	5	1	0.1	0.032	0.001	0.002	0.021	0.034	0.0640	0.00
12097	112	5	5	0.2	0.056	0.031	0.008	0.057	0.029	0.0000	0.00
12098	12	5	1	0.1	0.033	0.001	0.065	0.055	0.009	0.0000	0.00
14801	350	29	1	0.3	0.045	0.002	0.008	0.014	0.064	0.0000	0.00
14804	11	5	1	0.1	0.031	0.001	0.000	0.013	0.010	0.0640	0.00
14807	410	140	1	0.2	0.125	0.011	0.044	0.068	0.199	0.0000	0.00
14811	18	5	1	0.8	0.480	0.002	0.034	0.046	0.130	0.0000	0.00
14816	176	14	33	1.2	0.021	0.003	0.012	0.035	0.079	0.2933	0.00
13310	166	18	36	17.7	0.053	0.001	0.010	0.016	0.049	0.0000	0.03(c)
13311	11	5	1	1.0	0.033	0.000	0.004	0.014	0.012	0.0000	0.00
13313	102	5	1	3.4	0.045	0.000	0.006	0.017	0.015	0.0000	0.00
13314	6	5	1	0.9	0.064	0.000	0.005	0.014	0.015	0.0000	0.00
13315	19	5	1	0.8	0.061	0.000	0.003	0.011	0.014	0.0000	0.03
13300	18	5	1	1.4	0.730	0.001	0.005	0.009	0.198	0.0000	0.03
13301	509	20	100	32.8	0.160	0.004	0.018	0.028	0.068	0.0000	0.03
13302	7	5	1	0.2	0.045	0.000	0.004	0.016	0.012	0.0000	0.03
13316	12	5	1	0.7	0.113	0.000	0.005	0.013	0.032	0.0000	0.03
13317	190	15	4	0.8	0.064	0.001	0.009	0.021	0.012	0.0068	0.00
13318	58	5	1	1.0	0.071	0.009	0.005	2.750	0.044	0.0000	0.00
13319	7	5	1	0.7	0.052	0.000	0.003	0.016	0.012	0.0000	0.03
13323	257	10	35	12.4	0.030		0.009	0.013	0.176	0.0000	0.03
13325	591	11	145	44.3	0.198	0.003	0.030	0.021	0.027	0.0000	0.03
13326	16	5	1	0.8	0.187	0.000	0.007	0.020	0.026	0.0000	0.03
9341	491	40	1	2.3	0.122	0.002	0.016	0.019	0.033	0.0171	0.00
9345	165	5	26	32.8	0.011	0.002	0.012	0.035	0.159	0.0267	0.00
9348	180	5	14	9.8	0.014	0.001	0.012	0.001	0.039	0.0000	0.00
13249	189	10	17	2.7	1.060	0.040	0.024	0.037	0.099	0.0000	0.00
13250	16	5	1	0.8	0.016	0.002	0.004	0.060	0.016	0.0000	0.00
13251	15	5	1	0.9	0.014	0.002	0.004	0.103	0.017	0.0000	0.00
13254	66	5	11	7.1	0.400	0.003	0.012	0.010	0.203	0.0000	0.00

It is worth noting that in some cases labeling of bottled waters did not correspond with the contents as revealed by chemical analysis. One water, labeled "distilled," contained over 400 ppm Total Dissolved Solids and 0.044 ppm lead, and another labeled "deionized" contained over 500 ppm Total Dissolved Solids. Other waters, labeled "distilled," "deionized," or "U.S.P. Purified," contained more than the 5 ppm Total Dissolved Solids which, by definition in the ABWA guidelines, is the appropriate limit for such waters.

Bacteriological analyses (Table VI) show that four bottled waters gave positive tests for coliforms, and one of these gave a positive test for fecal coliforms. None of the bottled water showed evidence of the presence of *Pseudomonas aeruginosa*, and Standard Plate Counts showed wide variations. In regard to the latter, no attempt was made to relate high plate counts to a specific type of treatment because of the limited data. However, it seems apparent that these high plate counts occurred in water subjected to filtering or distillation, as

TABLE IV – Results of chemical analyses of water sources, in parts per million.

Sample no.	TDS	Cl	SO_4	NO_3	Cu	Mn	Pb	Fe	Zn	Hg(d)	As
13290	284	5	99	3.8	0.013	0.002	0.023	0.018	0.043	0.2338	0.00
13284	1077	11	280	0.7	0.023	0.691	0.063	7.160	0.065	0.0171	0.00
13293	527	6	69	21.6	0.015	0.063	0.033	0.088	0.078	0.1314	0.00
12093	319	25	10	0.1	0.070	0.013	0.011	0.580	0.023	0.0000	0.00
12096	441	12	2	0.2	0.184	0.047	0.010	0.322	0.361	0.0000	0.00
14802	173	10	38	1.7	0.029	0.004	0.004	0.030	0.010	0.0000	0.00
14806	864	105	1	0.1	0.093	0.040	0.012	0.088	0.552	0.1760	0.00
14810	863	90	1	0.1	0.049	0.020	0.012	0.046	0.056	0.0000	0.00
14815	174	11	37	1.2	0.028	0.005	0.005	0.082	0.035	0.0000	0.00
9340	390	9	48	44.5	0.109	0.004	0.022	0.046	0.031	0.0123	0.00
13252	59	5	15	1.0	0.060	0.043	0.013	0.187	0.014	0.3256	0.00

TDS – Total dissolved solids
(a) – 5 ppm chloride or less
(b) – 1 ppm sulfate or less
(c) – 0.03 ppm arsenic or less
(d) – Mercury reported in parts per billion

TABLE V – Fluoride determination of bottled water samples.

Bottler no.	Sample no.	F, mg/liter
1	13255	0.095
2	9347	0.077
3	9350	0.155
4	13253	0.070
5	9344	0.095
12	12005	0.130
12	12099	0.120
13	12095	0.095
14	14805	0.250
14	14808	0.370
15	14813	0.095
15	14817	0.125
16	14819	0.110
17	14809	0.071
18	13321	0.340
19	13308	0.125
19	13322	0.180
21	13309	0.280
22	13312	0.260
23	13328	0.370
24	13303	0.510
25	13324	0.660

well as in those subjected to any of the forms of disinfection commonly used in the bottling industry.*

The storage tests (Table VII) show cyclic variations of Standard Plate Counts. Samples which showed an apparent negative test when first bottled sometimes exhibited rapid bacterial growth, followed by apparent die-off and subsequent re-growth. Other samples started with high counts followed by die-off, and still others remained essentially bacteria-free. No significant number of *Pseudomonas aeruginosa* were found in any of the stored bottled waters.

*Examination of bottled water by the Food and Drug Administration showed similar results. Of 85 samples tested in the last fiscal year, eight contained organisms from the Coliform group. The standard plate count on these same samples ranged from 0 to 54 million. FDA's examinations were limited to bacteriology, pesticides and trace metals. (Unpublished data.)

TABLE VI – Bacteriological results after less than 30 hours storage.

Bottler no.	Sample	Treatment	Organisms per 100 ml Colif.	F. Colif.	*Pseudo*	Standard plate count per ml
1	Raw		1	0	0	1570
	Bottled	None	3	0	0	630
2	Raw		0	0	0	0
	Treated, tap	Fiber filter	0	0	0	800
	Treated, bottle	Fiber filter	0	0	0	670
3	Raw		0	0	0	0
	Treated, tap	Ozonation	0	0	0	0
	Treated, bottle	Ozonation	0	0	0	9
4	Raw		0	0	0	0
	Treated, bottle	Deionized + carbon filter + oz.	0	0	0	0
	Treated	Deionized + min + carb. filt + oz.	0	0	0	2
	Treated, bottle	Deionized + min + carb. filt + oz.	0	0	0	126
5	Raw		0	0	0	3
	Treated, tap	Deionized + carbon filter	0	0	0	230
	Treated, bottle	Deionized + carbon filter	0	0	0	1180
6	Treated, tap	Fiber filter	0	0	0	19
7	Raw		0	0	0	0
	Treated, tap	Deionized + UV	60	0	0	11
	Treated, bottle	Deionized + UV	2	0	0	2
8	Raw		0	0	0	14
	Treated, tap	Filter + UV	0	0	0	0
	Treated, tap	Distillation + ozone	0	0	0	0
	Treated, bottle	Filter + UV	0	0	0	0
	Treated, bottle	Distillation + ozone	0	0	0	0
9	Treated, bottle	Ion exchange	0	0	0	0
	Treated, bottle	Distillation + ozone	0	0	0	0
10	Raw		4	4	4	52
	Treated, bottle	Soften, filter, ozone, blend	0	0	0	2
	Treated	Soften, filter, ozone, blend	0	0	0	4
11	Raw		0	0	0	0
	Treated, bottle	Ion exchange	0	0	0	0
12	Raw		0	0	0	0
	Treated, tap	Chlorine + filter	0	0	0	TNTC
	Treated, bottle	Chlorine + filter	0	0	0	5
	Treated, bottle	Deionized + ozone	0	0	0	0
	Treated, bottle	Deionized + ozone	0	0	0	0
13	Raw		0	0	0	TNTC
	Treated, tap	Soften, ion exchange, ozone	0	0	0	1
	Treated, bottle	Soften, ion exchange, ozone	0	0	0	8
14	Raw		0	0	0	8
	Treated, tap	Distillation	0	0	0	TNTC
	Treated, bottle	Distillation	0	0	0	700
	Treated, bottle	Unknown	1	1	0	3000

TNTC = too numerous to count
oz. = ozone treatment
UV = ultraviolet treatment

TABLE VI – Bacteriological results after less than 30 hours storage. (Concluded)

Bottler no.	Sample	Treatment	Organisms per 100 ml Colif.	F. Colif.	*Pseudo*	Standard plate count per ml
15	Raw		0	0	0	250
	Bottled	None	0	0	0	1
	Treated, bottle	Distillation, ozone + carbon	0	0	0	300
	Treated, bottle	Distillation + ozone	0	0	0	2
16	Raw		0	0	0	0
	Treated, tap	Soften, distill, minerals, ozone	0	0	0	0
	Treated, bottle	Soften, distill, minerals, ozone	0	0	0	0
17	Raw		0	0	0	0
	Treated, tap	Distillation	0	0	0	300
	Treated, bottle	Distillation	0	0	0	1100
18	Raw		0	0	0	740
	Treated, bottle	Deionized + ozone	0	0	0	0
	Treated, bottle	Deionized, ozone, fluoride, mineral	0	0	0	3
	Treated, bottle	Demineralized + ozone	0	0	0	0
19	Treated, bottle	Distillation, fluoride, ozone	0	0	0	0
20	Treated, tap	Deionized, ozone	0	0	0	0
21	Treated, bottle	Ozone	0	0	0	0
	Treated, bottle	Distillation + ozone	0	0	0	2
22	Treated, bottle	Carbon + ozone	0	0	0	0
	Treated, bottle	Distillation, fluoride, ozone	0	0	0	1
23	Raw		0	0	0	210
	Treated, bottle	Distillation, UV, fluoride	0	0	0	4000
	Treated, bottle	Filter + UV	0	0	0	770
24	Raw		0	0	0	38
	Treated, bottle	Distillation + UV	0	0	0	0
	Treated, bottle	Ozone	0	0	0	0
25	Treated, bottle	Softened, UV	0	0	0	3

TNTC = too numerous to count
oz. = ozone treatment
UV = ultraviolet treatment

TABLE VII – Effect of storage on the standard plate count* of various bottled waters.

Storage period (days)	Bottler no. / Sample no.	1 / 13255	2 / 9347	3 / 9350	4 / 13253	5 / 9344	7 / 13298	8 / 13183	8 / 13184
1		630	670	9	126	1180	4	2	3
3		370	2160	1000	5000	143	20,000	350	18,000
5		630	210	2500	47,500	150	52,000	250	21,000
7		1120	360	6100	40,000	146	43,000	1300	11,000
10		379	5300	9000	32,100	129	76,000	670	70,000
14		1380	3900	2380	31,200	95	47,000	710	18,000
21		1440	9000	1430	43,000	11	40,000	1700	13,000
28		760	17,700	1010	32,000	71	35,000	2100	2200
35		460	41,200	690	14,200	59	33,000	1400	1400
49		550	2300	510	6000	70	48,000	4900	660
63		430	1700	430	11,700	13	61,000	1200	490

Storage period (days)	Bottler no. / Sample no.	9 / 13279	9 / 13280	10 / 13292	12 / 12005	12 / 12099	13 / 12095	18 / 13321	19 / 13308
1		1	1	3	60	1	14	0	0
3		5	3	4	140	0	15	3	0
5		31	39	4	250	2	110	34	0
7		36	25	69	1500	0	150	24,000	0
10		130	7	2700	1200	0	130	160,000	0
14		1100	39	29,000	1200	0	140	130,000	0
21		2200	1200	100,000	1500	0	140	49,000	0
28		1200	1300	53,000	750	0	310	44,000	0
35		690	880	56,000	600	0	100	18,000	1
49		700	1100	46,000	500	0	85	13,000	0
63		240	360	44,000	600	0	85	5800	0

*Average counts per ml, calculated from replicate plates, incubated for 48 or 72 hours at 35°C, using plate count agar.
0 = <1
LA = Laboratory accident
TNTC = Too numerous to count, at 0.01 dilution

TABLE VII – Effect of storage on the standard plate count* of various bottled waters. (Concluded)

Storage period (days)	Bottler no. / Sample no.	14 / 14805	14 / 14808	15 / 14813	15 / 14817	16 / 14819	17 / 14809
1		TNTC	625	0	550	0	TNTC
3		TNTC	240	0	800	0	TNTC
5		TNTC	150	0	TNTC	0	TNTC
7		640	400	0	TNTC	0	1100
10		200	750	0	TNTC	0	1100
14		140	TNTC	0	TNTC	0	950
21		90	TNTC	0	TNTC	0	1000
28		35	TNTC	0	TNTC	0	800
35		50	TNTC	0	TNTC	0	915
49		65	415	0	1300	0	520
63		70	510	0	720	0	400

Storage period (days)	Bottler no. / Sample no.	19 / 13322	21 / 13309	22 / 13312	23 / 13328	24 / 13303	25 / 13324
1		0	1	0	1300	1	350
3		0	1	LA	3300	0	160,000
5		0	2	0	19,000	4	400,000
7		0	1	0	29,000	3	550,000
10		0	5	0	33,000	2	480,000
14		0	10,000	0	31,000	180	370,000
21		0	15,000	0	28,000	5100	260,000
28		0	5500	0	27,000	5300	170,000
35		0	4600	0	11,000	2500	110,000
49		0	2200	0	5600	3800	57,000
63		0	130	0	7000	1500	67,000

*Average counts per ml, calculated from replicate plates, incubated for 48 or 72 hours at 35°C, using plate count agar.
0 = < 1
LA = Laboratory accident
TNTC = Too numerous to count, at 0.01 dilution

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APPENDIX A

AMERICAN BOTTLED WATER ASSOCIATION

GOOD BOTTLING PRACTICES GUIDELINES (INTERIM)
BOTTLED OR PACKAGED DRINKING WATER
PRODUCTION, PROCESSING AND PACKAGING Rev 6/1/71

The members of ABWA are joined as an association for the purpose of the advancement of the operations of the member companies, and the continuing improvement of service and products to the public.

The Good Bottling Practices Guidelines Program is being instituted to improve quality and service, and to inform the buying public of the high standards of quality and excellence that are to be maintained.

The Guidelines will be the basis of the production, processing, and packaging qualifications and the basis for plant approval upon recommendation by the Production Consultant. The first survey will be on the basis of satisfactory compliance with the Guidelines that control mineral content, cleanliness, sterility, and labeling of the packaged products. As the program progresses, additional guidelines may be added to the list governing approval.

The Production Consultant will recommend approval when the annual survey reveals justification. Approval will be continued as long as a plant meets the guidelines. Whenever a plant fails to pass survey, the approval may be withdrawn. All approvals and withdrawals will be authorized by the ABWA Board of Directors. The Consultant has authority to recommend to the Board only. He has no authority to issue the seal of approval, nor to withdraw the seal of approval.

I. PERMITS

A. No person shall bottle or package water to be sold or distributed without first having obtained a permit therefor from the appropriate governmental agency. This could be state, county, or city, or a combination thereof. Local regulations will dictate the need. This does not apply where no permit is required.

B. No water bottled or packaged in other states shall be sold, offered, or exposed for sale, or held in possession with intent to sell within a state unless the same is first inspected and registered and a proper permit obtained from the regulatory authorities.

II. WATER

A. *Source:* All natural waters to be bottled or packaged, or to be distilled or deionized must be procured from a source approved by the governmental agency issuing the permit, or the agency with jurisdiction.

B. *Bottled or Packaged:*

1. These products are to include natural spring, well, or other water, distilled water, deionized water, or any of the foregoing to which chemicals have been added, which is placed in sealed bottles, packages, or other containers to be sold for culinary or other domestic purposes involving a likelihood of the water being ingested by human beings.

2. All of the products that are described in B-1 are to comply with the Drinking Water Standards of the U. S. Department of Health, Education and Welfare, Public Health Service. Where local regulations are more stringent, they will take precedence in those particular stipulations. At all times, the strictest articles of regulations shall be observed. A complete quantitative chemical analysis of each type of water to be sold shall be made semiannually by an approved laboratory.

3. The ABWA Guideline for demineralized water by distillation, deionization, or other method is that it shall contain no more than 5.0 ppm of total solids.

4. U.S.P.H.S. Drinking Water Standards will be the basic bacterial standards for all bottled and packaged waters that are distributed for human consumption in the U.S.A.

5. The ABWA Guideline for waters offered for sale shall be that they are free from coliform organisms and have plate counts of less than 100 per milliliter. The standard plate count may not be exceeded in more than ten (10) percent of the samples collected.

6. Unopened bottles or packages will be delivered to a governmental laboratory or an independent laboratory having the approval of the governmental agency which issues the permit to the plant, or such agency may obtain samples with their own personnel direct from plant or truck. When samples are to be tested by governmental laboratories, it is preferable but not mandatory to have the samples collected by representatives of the respective laboratories. Samples will be taken from the containers in the laboratory by the laboratory technician. Samples may not be transferred from company bottles to laboratory sample bottles on the street or in other locations where the air is unsanitary. A minimum of one bacterial test will be made of each package once each month.

7. Member companies may perform the tests that are stipulated in the last sentence of B-6, using the Millipore system or other method approved by the Board. Sampling of each package should be performed at least semiannually by a certified commercial laboratory.

8. To be eligible for the Good Bottling Practices Seal of Approval, a plant must have complied with the ABWA Guidelines as stated in B-2, 3, 5, 6 and 7 for a period of one year or since the most recent previous survey. It is assumed that governmental agencies will

continue to sample the products and that results of these tests will comply with ABWA Guidelines. These agencies will not be required to test for total counts.

9. When ozone is used as a sterilant of bottled water, the water in glass bottles should have an ozone residual of not less than 0.05 ppm when the bottles are closed and in plastic bottles not less than 0.07 ppm.

C. *Processing:* Water to be used in a plant for bottle washing, hand washing, plant cleanup, and other sanitary purposes shall be delivered to the operating areas of the plant, under pressure, from a source that is approved by the governmental agency with jurisdiction control, or the one issuing the permit for the plant operation. This water will be tested monthly so that the owner may know that its use as a bottle rinse and for other critical purposes will not contribute bacteria to the products.

III. BOTTLING PLANT CONSTRUCTION AND SANITATION

A. The floors of all rooms where bottled water or packaged water is processed or bottled, or in which bottles are sanitized shall be smooth, impermeable, and rodent-proof. They may be constructed of ceramic or fire clay tile, cement, concrete, or other impervious material. All wet processing areas shall have floors impervious to water and all new floors shall have adequate and sufficient floor drainage to permit thorough cleaning without becoming flooded. Existing floors without proper drainage will be acceptable provided that portable walking surfaces, on which workmen will stand and walk, are used. The walking surfaces are to be removed daily so that puddles may be removed and floors properly cleaned. The floors will be subjected to daily cleaning, followed by sanitizing with water of 200 ppm strength of chlorine or quaternary ammonium compound. The latter may be applied by mop or spray.

B. The walls and ceilings of all rooms in which bottled water or packaged water is processed shall have smooth and washable surfaces, and shall be finished in a color sufficiently light to give good light reflection. The minimum height for ceilings in such rooms shall be eight (8) feet. The walls and ceilings are to be cleaned semiannually by scrubbing, using a suitable soap or detergent. Where bottling rooms do not exist and there are no ceilings, the inner surface of the roof supports shall be cleaned at regular intervals and kept free from accumulations of dust and dirt.

C. All rooms in which bottled or packaged waters are prepared, produced, or stored, or in which utensils are washed shall be ventilated so as to prevent excess condensation and corrosion. The ventilation system so designed and used must be located to preclude the intake of dust-laden air.

D. Adequate means shall be provided to exclude crawling insects and rodents from the entire plant and to exclude flying insects from bottling rooms or areas where bottle washing, filling, and closing operations are performed and from cooler processing rooms.

E. The entire premises, including floors, walls, ceiling, apparatus, devices, machines, counters, shelves, tables, and other parts of bottling works or facilities, equipment, etc. shall be so constructed and so located as to facilitate easy cleaning, and shall be kept clean and in sanitary condition. It is recommended that all new floors be coved to a height of six inches at junctions with all walls and the radius of the cove be one inch or more. All plans for alterations of existing facilities or for new construction must be reviewed and approved by the governmental agency issuing the permit for the plant and it is suggested that the plans be submitted to the ABWA Production Consultant for review and recommendations.

F. Adequate and convenient toilets shall be provided which shall be separate and apart from any room or rooms where bottled or packaged waters are processed, or where bottles or packages are sanitized. Toilet rooms shall be provided with self-closing doors. No toilet room shall be used for the storage of garments, food products, utensils, or packaging and/or wrapping materials. Toilets shall have separate ventilation flues or adequate windows to the outside air. Lavatories shall be provided with soap (preferably powdered or liquid soap from dispensers – bar soap becomes unsanitary), hot and cold running water, and approved one-use sanitary towels, and shall be maintained in clean and sanitary condition. Toilet room floors shall be of nonabsorbent and impervious material. Floors and fixtures will be cleaned and sanitized daily. Sanitizing materials will be as stated in III-A. Walls and ceilings will be kept clean.

G. In all rooms in which bottled or packaged waters are produced or prepared, or in which coolers or utensils are washed, sufficient natural or artificial lighting shall be provided to produce an intensity of not less than fifty (50) foot candles at inspection areas, thirty (30) foot candles in work areas, and five (5) foot candles in storage areas.

H. Every bottling plant shall have an approved sewage disposal system for all sewage and waste water.

I. All tanks used to store product water and all piping used to conduct water to the filling operation shall be of a type which can be cleaned easily, which is non-corrosive, and which will prevent toxic materials in excess of quantities permitted by the U. S. Department of Health, Education and Welfare, Public Health Service Drinking Water Standards from entering the water being transported. If more than one source of water is available in the plant, no cross connections shall be permitted between two different water supplies unless approved in writing by the governmental agency having jurisdiction. Tanks will be tightly enclosed to exclude all foreign matter. Tanks will be vented through inverted air filters.

J. While engaged in the work of processing bottled or packaged water, or sanitizing bottles or packages, employees shall wear clean, washable outer garments and

paper caps. Rooms shall be provided for the changing and hanging of street apparel apart and separate from the work areas, and such rooms shall be kept clean at all times. All clothes shall be removed from such rooms at intervals to allow thorough cleaning of the room.

K. Tobacco will not be used in any product processing room. Expectorating will not be permitted except into receptacles provided for waste or sewage.

L. Before beginning the work of preparing, mixing, or handling the ingredients used in bottling and packaging, and immediately after visiting a toilet, every person shall wash his hands and arms thoroughly and rinse them in clean water. Appropriate notice to this effect shall be posted in each toilet and dressing room.

M. No employee or other person affected with a disease or infection in a communicable or transmissible stage shall be permitted to work in any bottling or packaging plant, or to handle any of the products or equipment. Health certificates shall be obtained as required by governmental agency with jurisdictional control.

N. No work or storage areas of any bottling or packaging plant shall be used for sleeping or other household purposes.

O. No animal or fowl shall be kept or allowed in any bottling works or other place where bottled waters are produced.

IV. SANITIZING OF STORAGE AND BOTTLING EQUIPMENT

Product storage tanks, piping, filling equipment, bottle washers, crowners, and other equipment used to store, transport, and package the products sold by members of the Association must be maintained in clean and sanitary condition. A schedule of maintenance, cleaning, and sanitizing is a necessity. This activity is one of the most important in the production of high quality products at reasonable cost.

Records shall be kept by approved plants of all work performed as required by Sections B 2 and 3 so that the information will be available to the ABWA surveyor when he makes the annual survey.

A. *Maintenance:* This is an activity that must be scheduled by each plant operator as the plan must be tailored to the equipment and operating conditions of each plant. The Consultant will advise and counsel.

B. *Periodic Cleaning and Sanitizing:* The Guidelines would be excessively voluminous and complex if an attempt were made to create exact standards to cover all types of equipment presently in use. A generalization will be made, with a recommendation that each plant operator expand the program to fit the needs of his plant. As the program progresses, more exact and detailed guidelines can be produced.

1. *Semiannual:*

a. Product lines will be inspected for evidence of the formation of scale and the occurrence of oxidation. If conditions justify, the lines will be disassembled, cleaned and reassembled.

b. Fillers will be completely cleaned.

c. Softeners, charcoal filters, ozone tanks and equipment, soft water tanks, and other associated equipment other than product storage tanks will be opened, disassembled, cleaned, and reassembled as necessary.

d. All of the above equipment may be sterilized through the use of chlorinated water of 250 ppm strength with an exposure time of fifteen minutes minimum. Sterile water will be used as rinse water. Ozone treated water will do an effective job of sterilizing tanks, piping, and fillers. The ozone residual in the water should be 0.1 ppm minimum. When piping is sterilized, a residual of 0.05 ppm should be in the water at all discharge points. Sterilization of softeners and charcoal filters will be limited by the recommendations of the manufacturers of the materials.

2. *Tanks:* The types of water that are stored and the linings of the tanks will govern the frequency of cleaning of the tanks. In some cases, weekly scrubbing and cleaning will be necessary. Other conditions will justify longer periods between cleanings. Basically, the tanks will be kept clean and sterile. Each tank will be sterilized monthly by application of chlorinated water with a strength of 100 ppm and an exposure time of twenty (20) minutes or more. Sterile water will be used to rinse the tanks until they are chlorine free. Records will be kept of cleaning and sanitizing activities.

3. *Daily:*

a. Mechanical hydro bottle washers must be properly timed always. The jets must be kept cleared of paper pulp and other obstructions. The washers should be kept as free of label pulp as possible. Outside sprays will be kept in full operation.

b. All product lines between product storage tanks and fillers, and all fillers will be sterilized by steam or chlorinated water of 200 ppm strength. Product water will be used to rinse the lines until they are chlorine free. Ozone treated water may be used to perform this sterilization as described in IV, B, 1-d.

c. All other bottling equipment such as crowners, filters, etc. will be sterilized by chlorinated water of 200 ppm strength.

d. The use of sponges in containers of quaternary ammonium compound solution of 200 ppm strength is recommended for placement at all operating stations in the bottling or packaging area. The hands of operators can be kept sterile through use of this solution. The solution does not irritate the skin as chlorine does.

V. SANITIZING AND FILLING BOTTLES

A. *Sanitizing:* Before filling, all bottles shall be thoroughly cleaned by washing with an effective cleansing agent in water, the temperature of which is not less than 120°F, and shall, in addition, be subjected to an effective bactericidal process. A final rinsing of the

inside of bottles, using product water, may be used to remove traces of sterilants. The following bactericidal processes are considered to be effective:

1. Contact of the interior surface of the bottle for at least one-half minute with a chlorine solution containing at least one hundred parts per million free chlorine.

2. Contact of the interior surface of the bottle for at least two minutes with a solution containing at least 200 parts per million of an approved quaternary ammonium compound. If the detergent used in the cleaning process is a type which would neutralize the quaternary ammonium compound, then a clear water rinse shall be used before application of the quaternary ammonium compound.

3. Contact of the interior surface of the bottle for at least one minute with 2-1/2 percent caustic maintained at a temperature of at least 120°F, followed by a rinse with a chlorine solution containing at least ten (10) parts per million of free chlorine. If caustic is discharged into the bottles through high velocity jets, the preceding procedure shall be considered to constitute both cleaning and bactericidal treatment.

4. A wet method whereby the interior surface of the bottle is maintained at a temperature of not less than 170°F for a period of not less than 15 seconds.

5. Where automatic bottle washers in which caustic is discharged into the bottles through high velocity jets, commonly known as "hydro" type, or of the soaker type are used, such will be considered to constitute both cleaning and bactericidal treatment provided all surfaces of the bottles are exposed for at least five (5) minutes to a solution containing at least two and one-half (2-1/2) percent caustic and maintained at a temperature of at least 120°F, followed by rinse with clean water.

6. Any other method that is approved by the governmental agency issuing the permit, or having jurisdictional control.

7. When bottles are washed by caustic solution, the temperature of the solution shall be 120°F minimum and the caustic strength of the solution shall be 2-1/2% or more. Tests of these two qualities will be made at least twice daily and a record shall be kept as information for the ABWA surveyor.

B. *Handling:* At all times during the washing, handling, filling, and closing of clean bottles and packages, the bottles and packages shall be handled in a manner that will preserve the sterility of the inner surfaces and the lips of the openings. Handlers may not touch the inner surfaces and lips, allow the lips to contact clothing or other unsterile articles, sneeze or cough on the inner surfaces and lips, or commit unsanitary acts that may contribute bacteria to the products.

C. *Filling:* Immediately after sanitizing, all bottles are to be filled and closed. Accumulations are to be no greater than the capacity of the filler. During the filling and closing processes, all bottles are to be protected from dust, dirt, insects, and other forms of contamination. Hoods over the conveyor from the washer to the filler and from the filler to the capper will protect the open-clean bottles.

VI. SEALING OF BOTTLES

Immediately after filling, bottles shall be sealed in a manner which will adequately protect the quality of the contents of the bottles and prevent contamination of the end of the bottle necks.

A. Corks are subject to bacterial contamination and are not acceptable for use.

B. If screw or snap caps are used, they shall be new caps or shall be subjected to a sanitizing treatment equivalent to that required for bottles.

C. If crown caps are used, only new caps shall be used.

D. New screw, snap and crown caps may be used without prior sanitizing only if received in a condition of known cleanliness and freedom from bacterial contamination and kept until used in a manner which protects them from dust, dirt, insects, and other forms of contamination. Rooms in which caps and crowns are stored will be protected from insects, rodents, and dust. The rooms will be kept clean and sanitary at all times.

VII. LABELING

Each container must display information about it and the product that it contains as approved by the governmental agency issuing the permit. This information shall be embossed in the glass or imprinted on a label or closure.

A. Types of Water:

1. Demineralized water may be produced by one of several methods. The two principal methods are distillation and deionization. The designation on the labels shall be "Purified Water" by "Distillation" or by "Deionization."

2. "Spring Water" designates water that issues from the ground naturally. This water may be collected and controlled by pipes, tunnels, etc.

3. "Well Water" is water taken from the ground by drilling. The well may be flowing or one from which water is taken by pumping action.

4. "Drinking Water" may be any water prepared for human consumption. It must meet USPHS drinking water standards. This may be processed or manufactured water.

B. The name and location of bottling plants must be designated.

C. Net contents must be shown on each bottle.

D. *Misinformation:* This type of statement must not appear on labels:

1. Unsupported claims of medicinal and health giving properties.

2. Reference to bacterial and laboratory examinations made by governmental laboratories.

3. Untrue or misleading statements.

VIII. COOLERS

All coolers must be cleaned and sanitized in accordance with the Good Bottling Practices Guidelines of ABWA as approved by the Board and the membership at Las Vegas, Nevada in October 1965. A copy of these Guidelines may be obtained from the ABWA office in Los Angeles, California.

IX. SURVEY PROCEDURES

A. *Plant Operator and Supervisors:* It will be the continuing responsibility of the plant operator and the supervisors to maintain the plant in accordance with the Guidelines of ABWA and the controlling governmental agencies.

B. *Governmental Agencies:* Will be encouraged to make regularly scheduled inspections of the plants. Basically, the plant operator is responsible for the establishment of these schedules.

C. *Consultant or Other Authorized Agent of ABWA:* Surveys of plants for initial approval will be requested by members and a survey date will be set up that is convenient for both the member and the surveying agency. Surveys for reapproval will be made annually without advance notice of the time. Reports of the surveys will be prepared and submitted to ABWA Headquarters by the Consultant for review and recommendation of either acceptance or rejection of the plant seal of approval to the ABWA Board of Directors.

X. PRODUCT LIABILITY INSURANCE

A member company that is to be approved by ABWA will be required to have a product liability insurance policy in the amounts of $100,000 to $300,000 and to maintain this policy throughout the period of approval.

XI. LETTER OF AGREEMENT

After the survey has been completed, ABWA will send to approved companies a letter granting them the right to use the ABWA "Good Bottling Practices Seal of Approval" and outlining the restrictions and requirements for its use. When the approved company has signed and returned the letter of agreement to ABWA Headquarters, they will then have the right to use the Seal until it is revoked by the American Bottled Water Association.

APPENDIX B

STATE REGULATIONS PERTAINING TO THE QUALITY OF BOTTLED WATER, 1971 (Including regulations for Guam, Puerto Rico, the Virgin Islands and the District of Columbia).

1. ALASKA – No regulations specifically pertaining to bottled water. Handled under State Water Supply regulations or general public health powers.
2. ALABAMA – No specific regulations.
3. ARIZONA – No regulations specifically pertaining to bottled water, but handled under State Water Supply regulations and Food statutes.
4. ARKANSAS – The water source must meet the requirement of the Arkansas State Board of Health. (Rules and Regulations pertaining to Bottling Plants, adopted 1962.)
5. CALIFORNIA – Water must be free from coliforms, fluoride may be added, and label must not be false or misleading. (California Administrative Code, Title 17, Public Health, 1953, and California Pure Foods Act, 1968.)
6. COLORADO – Quality of bottled water shall conform to same standards as required for public water supplies – substantially the same as USPHS Drinking Water Standards, 1962. (Regulations for Quality of Water Supplies to the Public, 1967.)
7. CONNECTICUT – "No impure, contaminated or polluted water shall be used . . ." (An Act Concerning Non-alcoholic Beverages and Apple Juice, and Regulations Concerning Dietary Beverages – Apple Cider and Apple Juice, 1967, Department of Consumer Protection).
8. DELAWARE – No specific regulations pertaining to bottled water.
9. DISTRICT OF COLUMBIA – Importation of packaged food forbidden unless it comes from an inspected and approved source. No regulations pertaining specifically to bottled water. (D. C. regulations 8-6:105).
10. FLORIDA – Source must be approved by Florida State Board of Health, Bacteriological quality must be in accordance with Florida Sanitary Code, chemical analysis filed with Board for approval, and the label must give the chemical analysis and a statement of all substances added and treatment processes applied. (The Sanitary Code of Florida, Chapter 170C-22.)
11. GEORGIA – Bottlers or importer of waters must register with the Georgia State Health Department and have a bacteriological examination, and chemical analysis, if required, of the water by the State Board of Health Laboratory. At least one bottled sample must be submitted every month for bacteriological examination as to purity. (Rules of Department of Public Health, Chapter 270-5-14, adopted 1928.)
12. GUAM – No regulations specifically pertaining to bottled water.
13. HAWAII – No specific regulations, but the Hawaii Food, Drug and Cosmetic Act applies. The adulteration or misbranding of food is prohibited. (Hawaii Food, Drug and Cosmetic Act, 1967.)
14. IDAHO – No specific regulations, but all water must come from approved sources, and when bottled, meet the USPHS standards for drinking water and be bottled under sanitary conditions.
15. ILLINOIS – Water shall be of safe, sanitary quality from an approved system in conformance with applicable state and local laws, ordinances and regulations. (Food Manufacturing, Processing, Packing or Holding, General Rules and Regulations, with Interpretive Regulations for Bottlers of Soft Drinks and Waters, 1970.)
16. INDIANA – No bottled water offered for sale may show bacteriological or chemical content deleterious to public health. Samples must be submitted for potability and suitability at intervals designated by the state board. (Water Supply, Chapter 157, Acts of 1949 Indiana General Assembly.)
17. IOWA – Iowa Department of Agriculture has jurisdiction, and classes bottled water as a food. Although regulations do not specifically mention water, it is sampled and examined for potability by Iowa Department of Agriculture Laboratory. (State of Iowa Pure Food Laws, 1966.)
18. KANSAS – No specific regulations. Kansas Food, Drug & Cosmetic Act applies. (Similar to Federal FD&C Act.) Unless label indicates industrial or commercial use, drinking water standards apply. Label must be factual. (Kansas Food, Drug & Cosmetic Act of 1953, with amendments and regulations.)
19. KENTUCKY – No specific regulations, but bottled water must meet same requirements as public water supplies, i.e., chlorination, approval relative to treatment, chemical and bacteriological quality, approval relative to proper labeling, etc. (Kentucky Public Water Supply Regulations.)
20. LOUISIANA – Bottled water must be free from substances deleterious to health and shall conform to standards of the Louisiana State Board of Health for potable water. It must be labeled according to the State Food, Drug, and Cosmetic Act. (Sanitary Code, State of Louisiana, Chapter IV, Bottled Water and other Bottled Carbonated Beverages, 1963, the State Food, Drugs and Cosmetic Act, 1950, and General Regulations and Regulations Pertaining to Foods, 1944.)
21. MAINE – No specific regulations, but Health and Welfare Statute on the sale of water for domestic purposes applies. Samples may be required for chemical and bacteriological examination, and the sale

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or distribution of contaminated, polluted or unfit water may be prohibited. (Health and Welfare Statute, Chapter 559, Water for Homes or Schools.)

22. MARYLAND – No specific regulations, but laws pertaining to food and drink apply. Licenses to manufacture soft drinks are required, and may be denied if the water supply is known to be dangerously polluted. (Health Laws, Art. 43.)

23. MASSACHUSETTS – No ingredient or material, including water, shall be used in manufacture or bottling which is contaminated or injurious to health. If the water supply is not a public water supply, a description of the spring and an analysis of the water must accompany the permit application. (Laws and Regulations Pertaining to the Manufacture and Bottling of Carbonated Non-alcoholic Beverages, Soda Water, Mineral and Spring Water. General Laws, Chapter 94, as amended by Chapter 441 of the Acts of 1935.)

24. MICHIGAN – Regulations pertaining to non-alcoholic beverages and food apply. Only reference to water says it must meet USPHS standards for bacteriological purity. (Michigan Department of Agriculture, Regulation No. 549, Non-alcoholic Beverages, Michigan Food Law of 1968, Act 39 of 1968 as amended.)

25. MINNESOTA – Regulations pertaining to non-alcoholic beverages apply. Water used must be of safe, sanitary quality and from an approved source. (State of Minnesota Department of Agriculture Rules and Regulations Relating to Non-alcoholic beverages, Agr 985–994, Non-alcoholic Beverages Chapter 34.)

26. MISSISSIPPI – No specific regulations (bottling facilities are inspected by local county sanitarians).

27. MISSOURI – Laws and regulations pertaining to soft drinks apply. No material which is not pure, clean or wholesome may be used in manufacture. Water must be from an approved source and of sanitary quality as required by Division of Health standards. No fluorides may be added. (Laws Governing the Manufacture of Soft Drinks and Beverages in Missouri 196.365–196.445, 196.125–196.145, Regulations Governing the Manufacture of Soft Drinks and Beverages in Missouri, Missouri Revised Statutes, 1949).

28. MONTANA – Annual fee for bottling plants, water plant and source shall be inspected at least once each year. (Investigation of Water offered for Sale in Bottles and Other Containers, Regulation 79, 1918.)

29. NEBRASKA – No specific regulations, but rules and regulations for public water supplies are interpreted as applicable. Essentially the USPHS Drinking Water Standards of 1946 are the standards for chemical and bacteriological quality. (Rules and Regulations Relating to Public Health, Section XI, Water Supply Systems.)

30. NEVADA – Permit required for bottling or distribution, and permit issued only after compliance with water supply regulations, USPHS Drinking Water Standards and Nevada Food and Drink Establishment Act. (State of Nevada, Department of Health, Water Supply Regulations, 1952.)

31. NEW HAMPSHIRE – No impure water or unsafe source of water supply shall be used. All materials, including water, shall be pure and wholesome. (State of New Hampshire, Division of Public Health Services, Beverage Law and Regulations, 1967.)

32. NEW JERSEY – All water intended for distribution or sale as bottled water shall comply with the potable water standards established by the Department of Health. (Laws and Regulations Governing the Sale of Non-alcoholic Beverages and Bottled Water.)

33. NEW MEXICO – No specific regulations, but New Mexico Food Act applies. Wording similar to Federal Food, Drug and Cosmetic Act. (New Mexico Food Act, Chapter 169, Laws of 1951.)

34. NEW YORK – Bottled water, except mineral water, must comply with New York State Drinking Water Standards, State Sanitary Code for drinking water supplies applies. Bottled water cannot be sold unless the source, equipment and method of handling are approved by the State Commissioner of Health. (New York State Sanitary Code, Part 5, Drinking Water Supplies, 1967, and Public Water Supply Guide, 1971.)

35. NORTH CAROLINA – Bottled water must be safe for consumption and properly labeled. Supplier must take precautions to protect its purity. Samples must be submitted for bacteriological analysis. (North Carolina General Statutes 130–158, 130–131, 160–120 to 160–132.)

36. NORTH DAKOTA – Bottled water cannot be sold until the source of supply, equipment and method of handling have been approved by the State Department of Health. The State Laboratories Department (not connected to the State Health Department) registers companies which sell bottled water. State Health Department regulations do not apply to waters sold in labeled bottles registered by the State Laboratories Department. (State Health Department Regulation No. 69.)

37. OHIO – Bottled water classed as soft drink in Agriculture regulation. All water used shall be safe potable water free from pathogenic bacteria. Label must not be misleading. Prepared or compounded waters shall not be described as natural waters. Mineral waters must be of good quality when judged by sanitary chemical analysis. (Ohio Revised Code, Sections 913.22 to 913.28 and Section 913.99.)

38. OKLAHOMA – Except for mineralized water, the water shall comply with the USPHS Drinking Water Standards for chemical quality and frequency of analysis. Not less than two samples per month shall be tested for bacteriological quality. (Oklahoma State

Department of Health Rules and Regulations for the Production, Processing and Distribution of Bottled Drinking Water, 1963, Oklahoma Senate Bill No. 292, 1961.)

39. OREGON – No specific regulations, but Department of Agriculture food law applies. Bottling plant must meet minimum conditions required for any food processing plant, and water must be potable.

40. PENNSYLVANIA – No bottled water may be sold which is impure, bears evidence of potential pollution, or the use of which will be injurious or detrimental to the public health. Permit application must be accompanied by a report of bacteriological analysis and sanitary chemical analysis. (Act No. 396 of the Pennsylvania General Assembly, 1929, Commonwealth of Pennsylvania Department of Health Regulations pertaining to the Manufacturing, Bottling, and Selling of Certain Waters, Chapter 4, Article 421, 1959.)

41. PUERTO RICO – Bottled water shall meet the requirements of the Drinking Water Standards adopted by the U. S. Treasury Department for drinking water supplied by common carriers in interstate commerce. Bottled water may be sold only in individual containers duly labeled. (Insular Board of Health Sanitary Regulation No. 115, 1943, Health and Sanitation Laws, 350-1351 to 350-1376.)

42. RHODE ISLAND – Regulations specify sanitary conditions for bottling facilities and bottles, but no quality standards for water. (State of Rhode Island and Providence Plantations Department of Health, Division of Food and Drug Control, Chapter 21–23.)

43. SOUTH CAROLINA – No specific regulations, but bottled water is included in the definition of "Public Water Supply."

44. SOUTH DAKOTA – No specific regulations, but State Department of Agriculture laws apply. Foods must not be adulterated or misbranded. All beverages, including bottled water, must meet the same purity standards as food. (South Dakota State Department of Agriculture Laws, 22.0401 to 22.0411, 22.09904 to 22.9905, 22.0901 to 22.0905, 22.0916.)

45. TENNESSEE – No specific regulations, but Agriculture Department requires that bottled water meet the USPHS Drinking Water Standards.

46. TEXAS – All water must conform with chemical quality limits prescribed in USPHS Drinking Water Standards. Mineral water, however, need not meet mineral concentrations prescribed in standards. Samples are to be submitted for bacteriological analysis every two weeks. (Texas state Board of Health Minimum Standards for Production, Processing and Distribution of Bottled Drinking Water, 1952.)

47. UTAH – No specific provisions in State Code, but distributors must be licensed and licensing code requires periodic laboratory evaluation to insure that the water meets standards for purity.

48. VERMONT – Bottled water shall meet current USPHS Drinking Water Standards and be free from coliforms. It shall not have total bacteria count of more than 100 organisms per ml in not more than 10% of samples. (Vermont Health Regulations, Chapter 5, Subchapter 12, effective 1/26/61.)

49. VIRGINIA – Specific regulations for bottling plants, but none for water quality. Virginia Food laws prohibit sale of food or drink which is unwholesome or otherwise unfit for human consumption. (Virginia Department of Agriculture and Immigration, 1956, Virginia Food Laws, 1968.)

50. VIRGIN ISLANDS – No specific regulations.

51. WASHINGTON – Bottled water must be of a sanitary quality approved by the State Director of Health. (Rules and Regulations of the State of Washington Board of Health, Chapter 50, 1960.)

52. WEST VIRGINIA – Bottled water must meet the same requirements as public water supplies, which are essentially the same as the USPHS Drinking Water Standards. At least one sample per week must be submitted for bacteriological analysis. (West Virginia State Board of Health Public Water Supply Regulations, 1969.)

53. WISCONSIN – Bottled water classed as Soda Water Beverage by Wisconsin Department of Argiculture. All water used must be pure and free from pollution and contamination. (Wisconsin Statutes, Chapter 97, 1969, Wisconsin Department of Agriculture Statutes, Chapter Ag 41.)

54. WYOMING – Bottled water classed as food by State Department of Agriculture. Food must not be adulterated or misbranded. (Wyoming General Food, Drug and Cosmetic Laws, Vol. 8, Chapter 5, Articles 1–9, inclusive, Wyoming Compiled Statutes, 1957.)

APPENDIX C

GEOGRAPHICAL DISTRIBUTION OF WATER BOTTLERS IN THE U.S., BY STATE

State	No. of Bottlers	State	No. of Bottlers
Alabama	0 (c)	Montana	8 (c)
Alaska	Unknown	Nebraska	1 (c)
Arizona	5 (c)	Nevada	6 (c)
Arkansas	11 (c)	New Hampshire	2 (a)
California	63 (c)	New Jersey	21 (a)
Colorado	4 (c)	New Mexico	1 (c)
Connecticut	17 (a)	New York	16 (a)
Delaware	2 (c)*	North Carolina	7 (c)
District of Columbia	0 (c)	North Dakota	3 (c)
Florida	24 (c)	Ohio	50 (b)
Georgia	2 (c)	Oklahoma	13 (a)
Hawaii	2 (c)	Oregon	4 (c)
Idaho	1 (c)	Pennsylvania	43 (a)
Illinois	50 (b)	Rhode Island	4 or 5 (b)
Indiana	Unknown**	South Carolina	0 (c)
Iowa	Unknown	South Dakota	2 (c)
Kansas	20–25 (b)	Tennessee	1 (c)
Kentucky	2 (c)	Texas	50 (b)
Louisiana	5 (c)	Utah	1 (c)
Maine	15–20 (b)	Vermont	1 (c)
Maryland	12 (a)	Virginia	12 (c)
Massachusetts	16 (a)	Washington	3 (c)
Michigan	Unknown**	West Virginia	8 (c)
Minnesota	3 (b)	Wisconsin	5 (b)
Mississippi	2 (c)	Wyoming	2 (c)
Missouri	15 (a)		

(a) Licensed, registered or certified by the State.
(b) Estimated by State Health or Agriculture Department or by EPA Regional Office.
(c) Known according to State to be in operation.
* (Plus approximately 5 who bottle only in emergencies)
** (Estimated 20–30 Indiana and Michigan combined)

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APPENDIX D

BOTTLERS VISITED

Connecticut

*Pequot Spring Water Co., Glastonbury
*Triple Springs Spring Water, Meriden
*Great Bear Spring Co., Hampden
*Kelsey Spring Water Co., Middletown
Granite Springs Beverage Co., Thomaston
*Manitock Spring Water Co., Waterford

Texas

*Ozarka-Houston, Inc., Houston
*Houston Distilled Water Co., Houston
*Galveston Distilled Water Co., Galveston
*Triple XXX Bottling Co., Galveston
*Crysta-Pure, Inc., Houston
Brazosport Bottling Co., Freeport

California

El Rancho Markets, Inc., San Gabriel
*Deep Rock Water Co., Los Angeles
*Indian Head Water Co., Los Angeles
*Arrowhead Puritas Waters, Orange
*Silver Springs, Water, Inc., Orange
*Niagara Drinking Waters, Inc., Garden Grove
*Arrowhead-Puritas Drinking, Los Angeles
*Sparkletts Drinking Water Corp., Gardena

Ohio

Cedar Hill Farm, Inc., Cincinnati
Talawanda Spring, Inc., College Corner
*The Crystal Water Co., Dayton
Burger Brewing Co., Cincinnati
Vanderhaar Bros. Dairy, Inc., Evendale

*Indicates membership in ABWA

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APPENDIX E

BOTTLED WATER SURVEY

☐☐☐☐☐☐☐☐☐☐☐☐ EPA Office Use

Date this survey made ☐☐ ☐☐ ☐☐

Name of Bottler: _____

Street Address: _____

City, County, State: _____ ☐☐☐☐☐ zip code

Phone: ☐☐☐ - ☐☐☐ - ☐☐☐☐

Person Contacted and title: _____

Has a permit for operation been issued by the state? ☐ yes ☐ no

Is the Bottler a member of A.B.W.A.? ☐ yes ☐ no

Production:

Average production in gallons per day ☐☐☐☐☐☐.

Maximum capacity in gallons per day ☐☐☐☐☐☐.

Number of plant employees. ☐☐☐.

Containers Used:

Size	Type	Number Processed	Frequency per day	mo.	year	(check one)
			☐	☐	☐	
			☐	☐	☐	
			☐	☐	☐	
			☐	☐	☐	
			☐	☐	☐	

List the trade names of the water produced (i.e. spring, mineral, distilled) and attach labels if available.

Number of Sources of Water

☐ surface ☐ well ☐ spring

☐ purchased (list from whom)

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Treatment provided by Bottler (1=yes 2=no)

☐ disinfection	☐ coagulation	☐ sand filtration
☐ iron removal	☐ settling	☐ lime softening
☐ ion exchange	☐ distillation	☐ activated carbon
☐ other (list)		

Type of bottle washing equipment used?

Method of sterilizing bottles?

Method of Sterilizing process equipment?

Comments:

LABORATORY CONTROL

A. Bacteriological (Finished Water)

(1) Min. number samples recommended per month by PHS DWS [60 61] UNKNOWN [62]

(2) Avg. number/month for last 12 months [63 64] [65]

(3) Range of least and most monthly samples from [68 69] to [71 72] [73] [75]

(4) Number of months the Drinking Water Standards were not met during the last 12 months for: END CARD ONE [1] [80] UNKNOWN

(a) Quality [13 14] [15]

(b) Number of samples [16 17] [18]

(c) NONE collected [19 20] [21]

(5) Are samples representative of distribution system? [22] yes [23] no

(6) Are check samples collected as provided for in the Drinking Water Standards? [24] yes [25] no

(7) Are samples requiring check samples reported by telephone? [26] yes [27] no

(8) Is the laboratory certified? [28] yes [29] no

(a) Within the past 3 years? [30] yes [31] no

(b) If "yes" to one or both, by whom was it certified? [32] State [33] EPA

(9) Are samples received by lab within 30 hours? [34] yes [35] no

(10) Method of Analysis ☐ Tube method ☐ Membrane filter

(11) Analyzed by ☐ bottler ☐ state ☐ EPA ☐ local health

☐ other (specify)

B. Chemical (finished water only)

(1) Samples of finished water are analyzed each ☐ month ☐ year ☐ 2 years ☐ 3 years ☐ infrequently ☐ never.

(2) Type of analysis: ☐ complete (DWS) ☐ partial.

(3) Date of last chemical analysis ☐☐ mo. ☐☐ day ☐☐ yr.

(4) Analyzed by ☐ bottler ☐ state ☐ EPA ☐ local health ☐ other.

(5) Tests run for operational control and their frequency are:

Tests	Frequency				
	Continuous	Each shift	Daily	Weekly	Less frequently than weekly
Alkalinity	☐	☐	☐	☐	☐
Aluminum	☐	☐	☐	☐	☐
Chloride	☐	☐	☐	☐	☐
Chlorine residual	☐	☐	☐	☐	☐
Color	☐	☐	☐	☐	☐
Fluoride	☐	☐	☐	☐	☐
Hardness	☐	☐	☐	☐	☐
Iron	☐	☐	☐	☐	☐
Jar tests	☐	☐	☐	☐	☐
Manganese	☐	☐	☐	☐	☐
pH	☐	☐	☐	☐	☐
Taste & Odor	☐	☐	☐	☐	☐
Turbddity	☐	☐	☐	☐	☐
Zeta potential	☐	☐	☐	☐	☐
Other _____	☐	☐	☐	☐	☐

SOURCE, TREATMENT

A. Are the following adequate:

	YES	NO
(1) Source, with respect to the following:		
(a) quantity	18	19
(b) bacteriological quality	20	21
(c) chemical quality	22	23
(d) physical quality	24	25
(e) adequate protection	26	27
(2) Transmission of raw water	28	29
(3) Is the raw water sampled for:		
(a) bacteriological contamination	30	31
(b) chemical contamination	32	33
(4) Treatment, with respect to the following:		
(a) aeration	34	35
(b) chemical feed, capacity	36	37
(c) chemical feed, stand-by equipment	38	39
(d) chemical mixing	40	41
(e) flocculation	42	43
(f) settling	44	45
(g) recarbonation	46	47
(h) filtration	48	49
(i) disinfection, capacity	50	51
(j) disinfection, stand-by equipment	52	53
(k) taste & odor control	54	55
(l) fluoridation	56	57
(5) Records for:		
(a) disinfection	70	71
(b) filter runs	72	73
(c) chemical consumption	74	75
(d) operational control tests	76	77
(e) bacteriological examinations	78	79

BOTTLING PLANT CONSTRUCTION, SANITATION, AND OPERATION

A. Floors

1. Are floors smooth, impermeable, and rodent proof? ☐ yes ☐ no
2. Do all wet processing areas have adequate floor drainage? ☐ yes ☐ no
3. Do floors without adequate drainage have portable walking surfaces? ☐ yes ☐ no
4. Are floors cleaned and sanitized daily? ☐ yes ☐ no

B. Walls and Ceilings

1. Are all surfaces smooth and washable? ☐ yes ☐ no
2. Is the height of ceilings at least 8 feet? ☐ yes ☐ no
3. Are walls and ceilings cleaned at least semiannually? ☐ yes ☐ no

C. Ventilation and Lighting

1. Are process rooms ventilated so as to prevent excess condensation and corrosion? ☐ yes ☐ no
2. Are process rooms ventilated so as to preclude the intake of dust laden air? ☐ yes ☐ no
3. Are means provided to exclude insects from all process rooms? ☐ yes ☐ no
4. Is the lighting adequate? ☐ yes ☐ no

D. Toilet facilities

1. Are adequate and convenient toilet facilities provided? ☐ yes ☐ no
2. Are these facilities provided with self-closing doors? ☐ yes ☐ no
3. Are floors and fixtures cleaned and sanitized daily? ☐ yes ☐ no
4. Are sewage disposal facilities adequate? ☐ yes ☐ no

E. Employee Sanitation

1. Do employees wear clean, washable outer garments and paper caps? ☐ yes ☐ no

2. Are clean separate rooms provided for changing and hanging clothes? ☐ yes ☐ no

3. Is smoking prohibited in all product processing areas ? ☐ yes ☐ no

4. Are employees required to wash their hands and arms before work and after visiting the toilet? ☐ yes ☐ no

5. Are employees examined periodically for any health problems? ☐ yes ☐ no

F. Storage Tanks and Piping

1. Are tanks and piping easily cleanable? ☐ yes ☐ no

2. Are they made of non-corrosive material? ☐ yes ☐ no

3. Are there any cross-connections? ☐ yes ☐ no

4. Are tanks tightly closed and properly? ☐ yes ☐ no

G. Maintenance of Treatment, Storage, and Bottling Equipment

1. Is there an adequate schedule of maintenance, cleaning, and sanitizing? ☐ yes ☐ no

2. Are records kept of all work performed? ☐ yes ☐ no

3. Are product lines, fillers, softeners and other equipment inspected, disassembled, and cleaned as necessary? ☐ yes ☐ no

4. Are mechanical hydro-washers in proper operation and free from pulp and paper. ☐ yes ☐ no

5. Are product lines and fillers sterilized daily? ☐ yes ☐ no

H. Sanitizing, Filling, and Labeling Bottles

1. Are bottles thoroughly cleaned and sanitized by an effective bactericidal process? ☐ yes ☐ no

2. At all times after sterilization are bottles handled in a manner that will preserve the sterility of the inner surfaces and lips of the openings? ☐ yes ☐ no

3. Are bottles filled and closed immediately after sterilization? ☐ yes ☐ no

4. Are bottles sealed in a manner which will prevent contamination of the bottle necks or contents? ☐ yes ☐ no

5. Are all containers labeled properly ? ☐ yes ☐ no

6. Are bottle caps properly sterilized? ☐ yes ☐ no

APPENDIX F

TREATMENT PROCESSES, WATER SOURCES, PRODUCTS AND QUANTITY

Bottler no.	Treatment process (in sequence)	Water source	Product	Quantity (total)
1	None	Spring	Spring Water	300 gpd
2	Fiber filter	Spring	Spring Water	500 gpd
3	Ozonation	Well	Spring or Bottled Water	150 gpd
4	Deionization, carbon filter, ozone Deionization, carbon filter + minerals	Public Supply Public Supply	USP Purified Water Drinking Water	2500 gpd
5	Ion exchange, carbon filter	Spring	Spring Water	500 gpd
6	Fiber filter	Wells	Unlabeled	15 gpd
7	Ion exchange, carbon filter	Public Supply	Purified Water	400 gal/wk*
8	Filter, UV (glass bottles) Distillation, ozone Filter, ozone (plastic bottles)	Spring Spring Spring	Spring Water Distilled Water Spring Water	2500 gpd
9	Ion exchange Distillation, ozone	Public Supply Public Supply	Drinking Water Distilled Water	2500 gpd
10	Chlorine, lime softening, settling, filter, ozone, blending w/dist. Distillation, ozone	Well Public Supply	Spring Water Distilled Water	2100 gpd
11	None Ion exchange	Wells Wells	Well Water Well Water	15 gal/wk*
12	Deionization, ozone Deionization, ozone Chlorinate, carbon filter	Combined Combined Imported	Trace Mineral W. Distilled Water Spring Water	390 gpd
13	Softening, filter, ion exchange, ozone Softening, filter, ion exchange, ozone	Public Supply Public Supply	Drinking Water Distilled Water	1800 gpd
14	Add minerals None Distillation	Imported Imported Public Supply	Spring Water Spring Water Distilled Water	400 gpd
15	None Distillation, ozone Distillation, carbon filter	Imported Public Supply Public Supply	Spring Water Distilled Water Drinking Water	5000 gpd
16	Softening, distillation, minerals, carbon, filter, ozone, blend w/dist. Softening, distillation, filter, ozone	Public Supply Public Supply	Drinking Water Distilled Water	3300 gpd
17	Distillation	Public Supply	Distilled Water	1000 gpd
18	Softening, aeration, minerals, polyphos., ozone Softening, aeration, minerals, ozone Deionization, ozone	Wells Wells Wells	Drinking Water Drinking Water Purified Water	100,000 gpd
19	Chlorine, sand filter, ion exchange, carbon filter, ozone Ion exchange, distillation, ozone Chlorine, sand filter, ion exchange, carbon filter, fluoride, ozone	Springs Public Supply Springs	Spring Water Distilled Water Fluoridated W.	85,000 gpd
20	Ion exchange, ozone Ion exchange, ozone Ion exchange, fluoride, ozone	Public Supply Public Supply Public Supply	Drinking Water Purified Water Fluoridated W.	4500 gpd

Bottler no.	Treatment process (in sequence)	Water source	Product	Quantity (total)
21	Ion exchange, filter, ozone	Well	Pure Water	8000 gpd
	Distillation, ozone	Well	Distilled Water	
	Ion exchange, filter, fluoride, ozone	Well	Fluoridated W.	
22	Chlorine, sand filter, ion exchange, carbon filter, ozone	Springs	Spring Water	25,000 gpd
	Ion exchange, distillation, ozone	Public Supply	Distilled Water	
	Chlorine, sand filter, ion exchange, carbon filter, fluoride, ozone	Springs	Fluoridated W.	
23	Ultra-violet	Spring	Spring Water	4,000 gpd
	Reverse Osmosis, ion exchange or distillation, UV	Spring	Purified Water	
	Ion exchange or distillation, UV, fluoride	Spring	Fluoridated W.	
24	Distillation, UV	Public Supply	Distilled Water	14,000 gpd
	Ozonation	Well	Drinking Water	
	R.O., ion exchange, ozone	Well	Purified Water	
25	Ion exchange, fiber & carbon filters, Ultra-violet	Public Supply	Drinking Water	200 gal/wk*

*Indicates bottler operates intermittently
gpd = gallons per day